

## ATTACHMENT II-7

### CLOSURE PLAN

#### 1. PARTIAL LANDFILL CLOSURE

- a. At no time shall there be more than 450,000 square feet of Mixed Waste Landfill Cell (MWLC) footprint open to accept waste. After a sump of the MWLC has reached the maximum height of waste at the shoulder (32') with a slope of 5v:1h and the maximum height of waste at the peak (36.7') with a slope of 50h:1v, the clay cap shall be placed (including the filter layer).
- b. Each partially closed sump of the MWLC shall be covered with 12 inches of bulk clay cover.
- c. If there is no outer exposed waste embankment, perimeter slope segments for each sump shall, within 90 days of reaching slope half-height value and then slope full-height value, be covered with six inches of bulk clay or polymer spray coating.

#### 2. CLOSURE

All contaminated material in the storage areas shall be removed. The Mixed Waste Facility including the storage areas shall be decontaminated. All contaminated material shall be placed in the MWLC or otherwise managed in accordance with Attachment II-7, *Closure Plan*. The composite cover shall be placed on the MWLC. All closure fences, inspection roads, and ditches shall be constructed. During the final closure all tanks and containers shall be decontaminated, then removed from the Mixed Waste Facility or disposed of in a permitted landfill and in accordance with the destination landfill's permit.

- a. At least 180 days prior to the anticipated date of closure, the Permittee shall submit a detailed closure plan for approval of the design for the Mixed Waste Facility and a "Notice of Intent to Close" to the Executive Secretary. The Notice shall indicate the following:
  - i. that the entire Mixed Waste Facility shall be closed;
  - ii. the anticipated date of closure commencement;
  - iii. a preliminary schedule of closure;
  - iv. a general list of items and equipment for decontamination;
  - v. an engineering design report;
  - vi. a construction quality assurance manual;

- vii. closure drawings; and
  - viii. solid waste management unit remedial investigation study report.
- b. The stockpiled overburden from excavation at the site may be used in construction of the MWLC cover.
  - c. The final cover shall be installed in accordance with Attachment II-9, *Construction Quality Assurance/Quality Control Manual* and drawings in Attachment II-11, *Facility Drawings*.
  - d. Inspection roads and permanent site drainage, including drainage ditches, shall be constructed.
  - e. The retention pond and the run-on/run-off dike shall be removed.
  - f. A permanent, six-foot high chain-link fence shall be installed and maintained for a minimum of 30 years.
  - g. The entire Mixed Waste Facility shall be radiologically monitored to determine the spread of radiological contamination. If radiological contamination is detected, soil monitoring for hazardous waste contamination, shall be performed. If hazardous waste contamination is found near the boundaries of the Mixed Waste Facility, then monitoring shall also be performed off site as follows:
    - i. The entire Envirocare property shall be monitored around the perimeter for contamination, at distances of 50 feet and 100 feet beyond the property line to determine if contamination is present. All storage units shall also be monitored at 50 foot intervals in both directions; and
    - ii. A survey shall be performed on properties adjacent to the property owned by Envirocare, including the entire length of the railroad spur, to determine the extent (if any) of “off-site migration” of contaminated materials.
  - h. Soils with hazardous waste contamination shall be removed and disposed within the MWLC or closed as a landfill in accordance with UAC R315-8-7.
  - i. Closure certification shall be completed by a qualified, independent, Utah registered professional engineer and submitted to the Executive Secretary. The certification shall indicate that the closure was completed in accordance with the specifications of Attachment II-7, *Closure Plan*.
  - j. Land survey work as required, shall be performed by and certified by a Utah registered land surveyor.

- k. A closure report shall be submitted to the Executive Secretary and shall contain the following:
  - i. The general requirements;
  - ii. construction quality assurance/quality control activities;
  - iii. index providing location of relevant documentation not specifically included in the report;
  - iv. summary of construction activities;
  - v. results of QA/QC testing and monitoring;
  - vi. As-Built Drawings; and
  - vii. conclusions.

3. CLOSURE PERFORMANCE STANDARDS

- a. The material for disposal shall be placed in accordance with the closure engineering design report and attachments.
- b. Detection monitoring of air shall be continued for a minimum of one year after closure certification.
- c. Detection monitoring of groundwater shall be continued for a minimum of 30 years after closure certification.
- d. Erosion control and flood protection shall be provided for a minimum of 30 years after closure certification.
- e. The site shall be fenced both during and after construction to restrict public access. Custodial maintenance and surveillance shall be provided.
- f. The Permittee shall provide on or before February 1 of each year, a report to the Executive Secretary for the preceding calendar year. The report shall summarize post-closure activities, results testing, monitoring and surveillance activities.

4. COMPOSITE COVER (RADON BARRIER) ELEMENTS OF DESIGN

- a. The MWLC shall be overlain with a composite cover that shall include a low permeability compacted clay layer, a drainage layer, an HDPE geomembrane, and a rock erosion barrier.
- b. The low permeability clay layer shall be two feet in depth. The clay layer shall be installed in accordance with Attachment II-9, *Construction Quality Assurance/Quality Control Manual*. The clay shall have a final hydraulic conductivity of  $5 \times 10^{-8}$  cm/sec. The compaction of the low permeability clay layer shall be at least 95% of the Standard Proctor for the clay used. The compaction of the clay shall produce a soil barrier that shall prevent radon gas

from leaving the cell. This compaction shall also protect the disposal material from moisture. The cover system shall reduce the potential for drying of the compacted clay by trapping dew and condensation.

- c. The composite cover shall be designed and constructed to contain the following elements (from the bottom):
  - i. A two-foot  $5 \times 10^{-8}$  cm/sec compacted clay barrier;
  - ii. A 60 mil HDPE textured geomembrane;
  - iii. A 12 oz. geotextile;
  - iv. A six-inch granular drainage layer;
  - v. A 6 oz. geotextile;
  - vi. a one-foot sacrificial soil layer (freeze-thaw barrier);
  - vii. a six-inch granular filter layer; and
  - viii. a one-and-one-half-foot rock erosion barrier.
- d. Water that gets into the drainage layers should be drained off the MWLC into the surface drainage channel and shall ultimately be drained from the area.
- e. The Permittee shall submit to the Executive Secretary, for review, comment, revision as necessary, and approval, a Cover Construction Design Engineering Report. The Design Engineering Report shall cover all aspects of construction and shall be reviewed and approved by the Executive Secretary prior to the Permittee beginning construction.

## 5. EROSION BARRIER- ELEMENTS OF DESIGN

- a. The top of the MWLC shall be covered with rock of one-and-one-quarter-inch mean diameter at a slope of 50H:1V, and the side slopes shall be covered with rock having a mean diameter of four-and-one-half-inches at a slope of 5H:1V.
- b. Underlying both top and side slope layers shall be a filter zone, six-inches thick, having a mean diameter of approximately one-and-one-half-inches. The filter zone protects the radon barrier from deep penetration by the larger diameter rock used for outer cover.
- c. The rock layer shall be an erosion barrier designed to provide protection during normal, abnormal, and Probable Maximum Precipitation (PMP) events. A PMP event is defined as the maximum precipitation that could occur from the most severe combination of meteorological conditions that are reasonably possible in a region.
- d. The rock layer shall be constructed to protect the MWLC from wind erosion, and shall discourage plant root intrusions and burrowing animals.

6. SITE DRAINAGE - ELEMENTS OF DESIGN

- a. Drainage ditches shall be located around the base of the MWLC and shall direct the flow into the natural drainage pattern west of the site. The ditches shall have triangular cross sections with side slopes constructed and maintained at 5v:1h. To prevent the formation of gullies that could cut headward into the MWLC, the outer slopes of the access road adjacent to the MWLC shall be covered with rock erosion protection.
- b. Attachment II-11, *Facility Drawings*, shall show the cross-section of the ditches and roadway designed for any MWLC at South Clive.

7. STRUCTURAL STABILITY - ELEMENTS OF DESIGN

- a. To protect the MWLC from the effects of water erosion, the MWLC slopes shall be limited 5v:1h. The top of the MWLC shall be convex with gentle 50h:1v slopes to promote drainage.
- b. To ensure that the MWLC can withstand water erosion during the design life, the surfaces of the radon barrier shall be graded, the corners rounded, and the entire MWLC radon barrier shall be covered with a rock erosion barrier.
- c. To protect against the erosive effects of a PMP, the side slopes of the embankment shall be covered with a 1.5 foot thick layer of graded rock material.
- d. The rock layer shall be constructed to provide protection against wind erosion.
- e. Seismic (static and dynamic) analysis shall be performed on the embankment design as part of the engineering design report. The horizontal acceleration and factor of safety shall be determined from current technical guidance documents.

8. MAXIMUM WASTE INVENTORY

- a. The MWLC shall have capacities as defined in Table V-I of Module V.
- b. The maximum quantity of waste at the site, which is inclusive of all waste outside of permitted disposal areas, shall not exceed 15,625 cubic yards. Within this 15,625 cubic yards, the quantity of untreated waste at the site shall not exceed 7,000 cubic yards of which ~~50-100~~ cy (~~4020~~,000 gallons) is condensate. These limits include waste that was generated both on-site and off-site and includes materials that when wasted would become an untreated hazardous waste, such as the decontamination water within the 90-day tanks at the wash bay and laboratory chemicals.

- c. The Permittee shall maintain a reserved capacity in the MWLC of 49,953 cy for disposal of remediation waste. Reserved capacity volume includes equipment, demolition debris, soils, and ballasts as identified in Attachment II-7-1.

9. INVENTORY AND EQUIPMENT DECONTAMINATION

- a. During the closure process the Permittee shall decontaminate all equipment in accordance with Attachment II-1-6, *Leachate, Evaporation, and Decontamination Waste Management Plan*, and the Permittee's Radioactive Materials License at the time of closure. The following scenarios apply:
  - i. If equipment has been triple rinsed, and is visually clean using reasonably achievable methods, PCB decontaminated in accordance with 40 CFR 761.79, and radiologically decontaminated it may be disposed of in a municipal landfill or salvaged.
  - ii. If equipment has been triple rinsed, and is visually clean using reasonably achievable methods, PCB decontaminated, and does not meet radiological release limits it may be disposed of in the LARW embankment or the MWLC.
  - iii. If equipment does not meet treatment standards, it shall be treated and disposed of within the MWLC.
- b. Portable high pressure water washing systems, and/or portable steam generators shall be used to decontaminate construction equipment, train track rails, unloading ramps, etc. The scenario for extremely difficult decontamination, may be remediated by sandblasting for removal of contamination. The limits specified the Permittee's Radioactive Materials License shall be achieved prior to releasing equipment from the site.

10. CLOSURE OF CONTAINERS

- a. Containers less than or equal to 110 gallons with wastes that meet treatment standards shall be emptied, placed in the MWLC, crushed and disposed of in accordance with Module V of this Permit. Wastes that require treatment shall be treated to meet the treatment standards and then disposed of within the MWLC. During the closure process the Permittee shall decontaminate all other containers to uncontaminated levels as required by the Permittee's Radioactive Materials License at the time of closure. Decontamination may be performed in accordance with Attachment II-1-6, *Leachate, Evaporation, and Decontamination Waste Management Plan*.

11. CLOSURE OF TANKS

- a. All wastes removed from tanks shall be characterized and treated if necessary to meet treatment standards and disposed. During the closure process the Permittee shall decontaminate all tanks to uncontaminated levels as required by the Permittee's Radioactive Materials License at the time of closure. Decontamination may be performed in accordance with Attachment II-1-6, *Leachate, Evaporation, and Decontamination Waste Management Plan*.

12. SCHEDULE FOR CLOSURE

- a. The Permittee anticipates that closure of the landfill will occur in approximately 2014.

13. CLOSURE COST CALCULATIONS

- a. There are two closure cost estimates for the Mixed Waste Facility. Attachment II-7-1 covers the closure costs for the entire facility excluding the costs associated with condensate management from Vacuum Thermal Desorption (VTD) operations. Attachment II-7-1.2 covers closure costs associated with condensate management from Vacuum Thermal Desorption operations
- b. Closure costs for the Facility shall be based on closure performed by a third party of the Permittee's Mixed Waste Facility after commencement of landfill operations. Costs were developed after talking with several excavating companies that have had experience working on similar projects, R.S. Means Heavy Construction Data, current edition, and from prices of work actually performed at the Permittee's current LARW facility at South Clive. Prices for synthetic materials were obtained from distributors and installers. The costs shall be adjusted for inflation and shall be reported in current year dollars.
- c. The closure cost estimates are provided in Attachment II-7-1 and II-7-1.2 shall be adjusted annually for inflation. Closure costs may also be adjusted if sufficient information can be developed which substantiates the adjustment.
- d. Closure cost estimates shall be updated and the Closure Trust shall be made whole prior to any new hazardous waste management unit accepting waste. The update shall be performed for any new unit or when any existing hazardous waste management unit is changed, modified or altered in size in any manner or fashion.
- e. For the Facility, a total trust amount based on cost estimates for items in Attachment II-7, *Closure Plan* shall be provided in Attachment II-7-1. Costs for mobilization, general cleanup, and administration shall be included in the closure

cost estimate. This total shall be established specifically for the Permittee's Mixed Waste Facility non-inclusive of other facilities within Section 32.

- f. For the condensate generated from VTD operations, a total trust amount based on cost estimates shall be provided in Attachment II-7-1.2.

14. QUANTITY CALCULATIONS

- a. Quantity Calculations for the Facility are detailed in Attachment II-7-1, *Closure Cost Estimate*.
- b. Quantity Calculations for the VTD condensate are detailed in Attachment II-7-1.2, *Cost Sheets for VTD Condensate*.

15. FINANCIAL ASSURANCE MECHANISM FOR CLOSURE

- a. Closure, Post-closure Irrevocable Letter of Credit and Standby Trust Agreement.
  - i. The Irrevocable Letter of Credit and Standby Trust Agreement shall be for the maximum amount that would be needed to place all contaminated material properly into the MWLC, to decontaminate the site, and to complete all phases of the MWLC to the required standards, and to monitor the site for 30 years after closure certification.
  - ii. The amount of the Irrevocable Letter of Credit and Standby Trust Agreement shall be reviewed annually, and adjusted as necessary.
- b. The mechanics of the Irrevocable Letter of Credit and Standby Trust Agreement shall be as follows:
  - i. The Irrevocable Letter of Credit and Standby Trust Agreement shall be set up in accordance with the Irrevocable Letter of Credit and Standby Trust Agreement required by UAC R315-8-8. The language shall be set as to satisfy the Utah Division of Radiation Control and the Executive Secretary.
  - ii. The Trust Agreement shall be set up in the name of the Executive Secretary. The Irrevocable Letter of Credit and Standby Trust Agreement amount may change upon annual review or Permit modification approval. When the Executive Secretary has determined pursuant to the Permit that the Permittee has failed to perform final closure in accordance with Attachment II-7, *Closure Plan*, the Executive Secretary shall draw on the Letter of Credit.



- iii. If the Permittee does not establish alternate financial assurance as specified in UAC R315-8-8 and obtain a written approval of such financial assurance within 90 days after the Permittee and the Executive Secretary receive notice from the issuing institution that it has decided not to extend the Letter of Credit beyond the current expiration date, the Executive Secretary shall draw on the Letter of Credit. The Executive Secretary may delay the drawing if the issuing institution grants an extension of the term of the credit. During the last 30 days of any such extension, the Executive Secretary shall draw on the Letter of Credit if the Permittee has failed to provide alternate financial assurance as specified in UAC R315-8-8 and obtained written approval of such alternate assurance from the Executive Secretary.
- iv. The Permittee shall use only financial institutions for the Irrevocable Letter of Credit and Standby Trust Agreement that are Federal Deposit Insurance Corporation (FDIC) approved or are continuously listed in the ABA Directory of Trust Banking during the period of performance of Irrevocable Letter of Credit and Standby Trust Agreement. The Permittee shall be responsible for timely payment of all fees and costs associated with administration and maintenance of either the Irrevocable Letter of Credit or the Standby Trust Agreement.

END OF ATTACHMENT II-7